



AMASS Overview

**AMASS Version 5.3
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ADIC
11431 Willows Road, NE
PO Box 97057
Redmond, WA 98073-9757 USA
Phone: 425-881-8004
FAX: 425-881-2296

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Preface

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Purpose of This Book

This book provides an introduction or high-level summary of AMASS, ADIC's Archival Management and Storage System software application.

Who Should Read This Book

This book is written for prospective customers as well as for the system administrator who will be using and maintaining AMASS.

How This Book is Organized

This book contains the following chapters:

Chapter 1: Online Archiving with AMASS — The benefits of using AMASS to archive your data

Chapter 2: Accessing the Storage Network — Supported: access protocols, system security, storage devices, connectivity, and Fibre Channel

Chapter 3: Technical Support — Technical support available to you

Glossary — Defines terms

Conventions

The conventions used throughout the AMASS technical books are listed below:

Convention	Example
The word “library” usually includes “jukebox” and “standalone drive” and is a generic way to reference a storage device.	If using HP SunSpot jukeboxes, install patch 1234.
Screen text, file names, program names, and commands are in Courier font.	Request to add a new volume: Volume group will be “20” Volume position will be “A123”
The root prompt is shown as a number symbol.	# su root
What you should type in is shown in Courier bold font.	bulkinlet 1,2-10,21,23
Site-specific variables are in a <i>Times italics</i> font.	tar -xvf <i>tapedevicename</i>
A backward slash (\) denotes the input is continued onto the next line because the printed page is not wide enough to accommodate the line.	# rsh <i>nodename</i> -n dd \ if=/cdrompath/amass/load.tar\ bs=20b tar xvBfb - 20 (Type the entire command without the backward slash.)
Pressing <Return> after each command is assumed.	
A menu name with an arrow refers to a sequence of menus.	Edit Policy —> Add Library

1

Online Archiving with AMASS

NOTES

Using AMASS to Archive Your Data

The Archival Management and Storage System (AMASS) is a management tool for your storage solution.

Files are archived to media stored in robotic libraries, jukeboxes, and standalone drives. The archived file system managed by AMASS is supervised by a system administrator who oversees the following components:

- File System
 - Directory information
 - IO activity
- Libraries, Jukeboxes, Standalone Drives
 - Status of elements
- Drives
 - Dedicate drives for write-only or read/write
 - Toggle online and offline status of drives
 - Clean dirty drives
- Media
 - Load, unload, and move media
 - Read offline media
 - Assign volume groups
 - Assign media to a home storage slot
 - Make media read-only or read/write
 - Delete files on media

Archive versus Backup and Restore

Backup and restore applications are usually an automatically scheduled operation aimed at protecting original data against any kind of loss or damage.

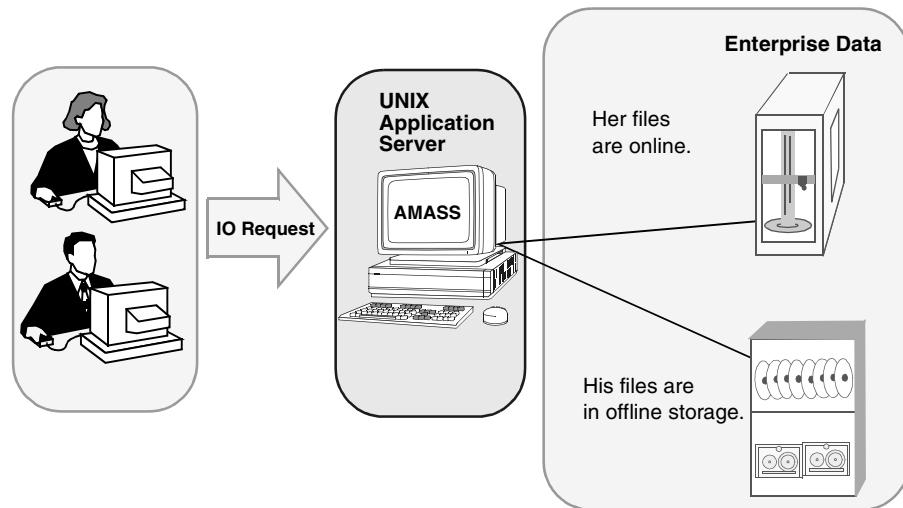
The goal of archiving is usually to conserve online storage space. It is more cost effective to store infrequently accessed data on lower cost media.

Files Viewed as Online

When applications need to *read from* or *write to* archived files, the files appear as a single, mounted file system on the UNIX server.

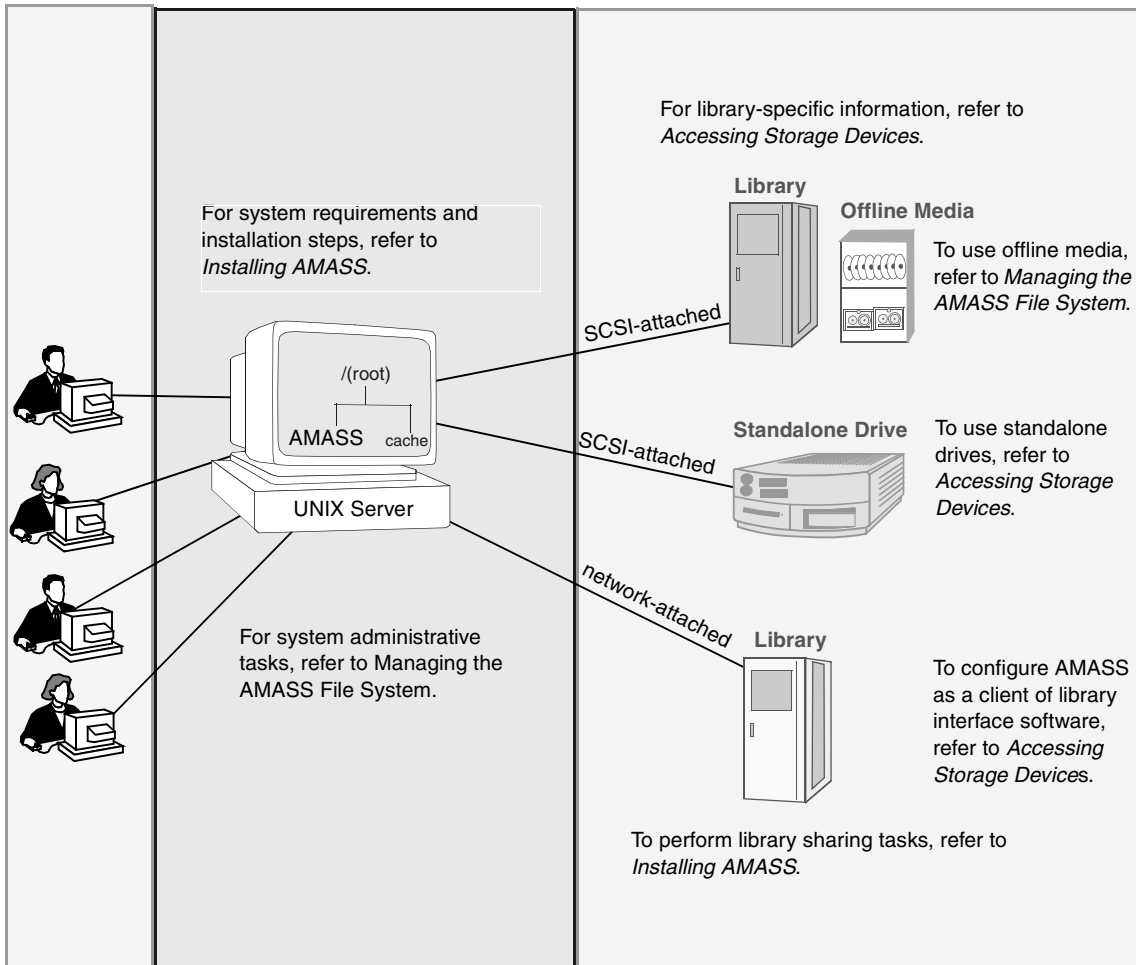
Applications can read from the files or write to the files the same way they would read or write to a hard disk. Therefore, the extensive storage capabilities provided by storage hardware appear as one large file system.

Although applications view their files as being located on the UNIX server, in reality they are stored on multiple storage system—or even on offline storage.



Documentation Set Overview

The figure below provides an overview of an AMASS-managed storage solution and a reference to other books in the AMASS documentation set.



Benefits of Using AMASS

The management tool for your storage system should provide:

- Performance
- Data integrity
- Ease-of-use
- Flexibility

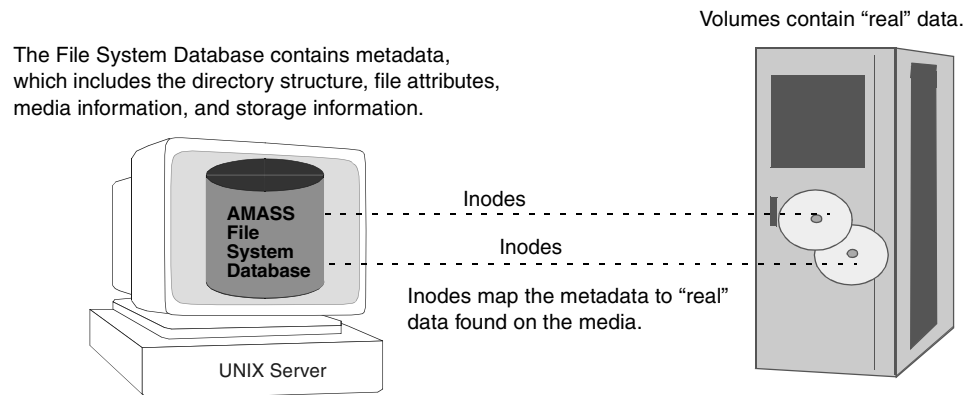
The benefits of using AMASS are described in the following table:

Topic	Page
Database Improves Performance	1-6
Design Prevents Thrashing	1-9
Cache Optimizes Requests	1-9
Virtually Unlimited File System Size	1-10
Design Maintains Data Integrity	1-13
Increased Throughput	1-15
Tools	1-18
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Database Improves Performance

AMASS keeps a File System Database, resident on the UNIX server's hard disk, of attributes (commonly referred to as metadata) describing the stored data. Attributes consist of access time, user ID, block size, file size, and so forth. This Database grows as files and directories are added to the file system.

The following figure illustrates the concept of how the File System Database maps the file system data to the volumes in the library.



Faster Performance

Because the File System Database is resident on the server's hard disk, utilities and system calls operate quickly because they access the Database instead of the actual files on the library.

Basic commands such as directory listings (`ls`), changing the working directory (`cd`), and even searching through part or all of the file system for files of given attributes (`find`), operate on the File System Database—not the volumes in the library.

Less Media Contention

A secondary benefit of the disk-resident File System Database is less media contention in the library when multiple users are accessing the AMASS file system. Because only the actual read and write system calls need to access the library, more operations can be completed without waiting for media changes.

Automated Backups via Cron Job

Because the File System Database is extremely important, this information **must** be protected. Consequently, the `amassbackup` command, run from a `cron` job, regularly backs up both the Database and the Journal. The Journal is a transaction log of daily activity. This `cron` job is created when AMASS is installed. The `cron` job backs up the Database and Journal to a Backup Volume at 3 a.m. using the following schedule:

- First day of the month—Full Backup
- All other days—Partial Backup
After the backup completes, AMASS truncates the Journal file.

If the above schedule is not suitable for your site, modify the schedule by editing the `crontab` and changing the `amassbackup` entries. For detailed information on making a Backup Volume and editing the `cron` job, refer to *Managing the AMASS File System*.

Caution

Make sure these backups are successful. Look in the system log every day for a “Backup was successful” message.

The full backup (backs up the Database and Journal) and the partial backups (backs up just the Journal) will allow you to successfully restore your File System Database (and, therefore, allow you to know where data is located on what piece of media) if your current File System Database gets corrupted or the hard disk crashes.

Design Prevents Thrashing

In a storage environment, there are many volumes but only a few drives. If several requests come in for many different volumes, the potential exists for AMASS to spend most of its time moving media in and out of drives and little of its time actually processing requests.

The following items help AMASS handle many simultaneous requests, thus preventing thrashing as well as optimizing requests:

- Request queue sorting
- Read-ahead
- Write-behind
- Prioritizing algorithm

Cache Optimizes Requests

The AMASS cache resides on a hard disk attached to the UNIX server where AMASS is installed. The cache implementation follows all UNIX file system conventions for synchronous IO, `sync`, and `fsync` functions.

Data caching provides the following benefits:

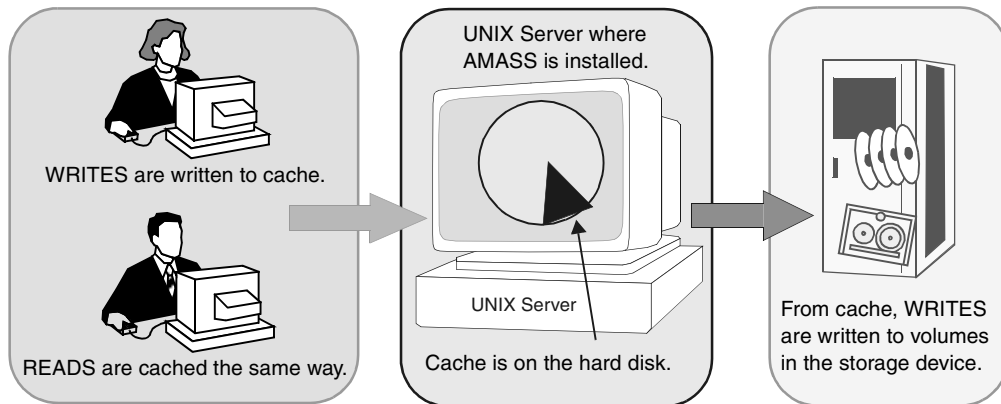
- Faster system performance
- Protection against thrashing

In addition, a large cache allows large files to be queued faster before being moved to a library thus increasing throughput.

After files are in the cache, multiple writes to the same volumes are grouped into single operation that minimizes volume movement and maximizes throughput. Therefore, a high aggregate throughput is achieved through the following items:

- Grouping write operations in the cache

- Prioritizing reads-from-volumes over writes-to-volumes



Configurable Cache

The cache size can be configured to take advantage of both the application being used and the system environment where AMASS is installed.

Applications running database tables in the library, may need a larger cache configuration to optimize the number of cache hits and allow updates to table headers to be predominantly cache IO.

The cache parameters are configured during installation. For information on sizing the cache, refer to *Installing AMASS*.

Virtually Unlimited File System Size

Although every attempt is made to keep files under a specific directory on one volume, files can span media. Consequently, a directory can reside on more than one volume.

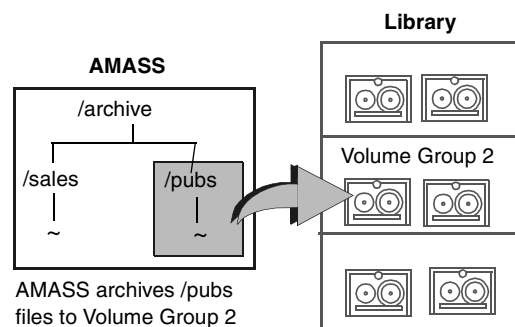
Regardless of the physical size, all the volumes appear as a single logical device, of admittedly large capacity. AMASS supports a maximum of 65,000 volumes.

When a volume is full, AMASS automatically selects the next available volume to continue its operations. The volumes that make up AMASS can be subdivided, if desired, into multiple groups called volume groups.

Volume Groups

Archiving files by projects can be achieved with volume groups by assigning volumes to numerical volume groups to serve a particular subdirectory tree.

Because these volume groups can be assigned to contain specific directories, the system administrator can assign volumes for specific purposes within AMASS without losing the benefits of a single file system and a single mount point that spans media. This concept is illustrated by the following figure:

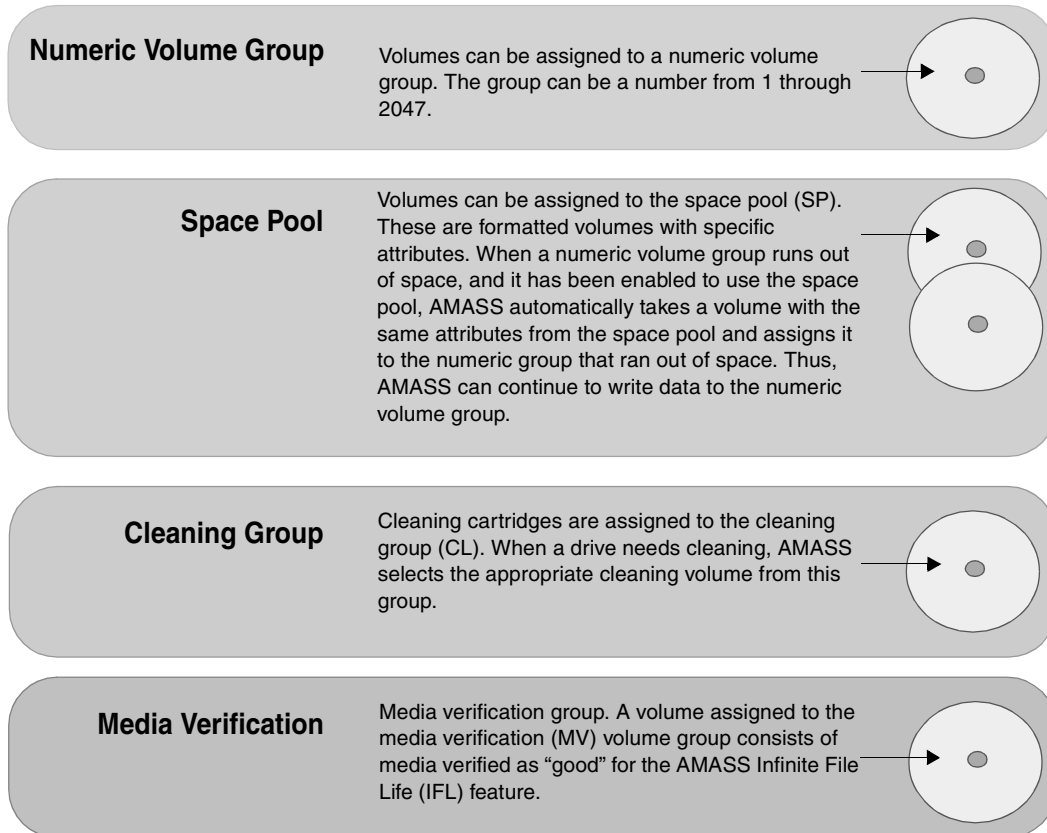


Types of volume groups are listed below:

- A numeric group, 1 through 2047
- A space pool (SP)
- A cleaning group (CL)
- Media verification group (MV) for the optional Infinite File Life feature

For more information about IFL, refer to the appendix in *Installing AMASS* and in *Managing the AMASS File System*.

The following figure illustrates these volume groups:



After a volume has been assigned to a numerical volume group, all writes to the volume group directory and its subdirectories go to the specified volumes. No other data is placed on these volumes. Therefore, when all the volumes are filled up, subsequent writes fail because the volume group is full. However, when a volume group is full, you can do one of the following:

- Add volumes to the volume group.

- Allow AMASS to automatically assign a volume from the space pool to the out-of-space volume group. Do this by using the AMASS `vgpool` command to enable space pool for the specified volume group.

For more information on volume groups, refer to *Managing the AMASS File System*.

Uniform Media in Numerical and Cleaning Groups

Except for the space pool, a volume group must contain a homogeneous type of media; therefore, in multifunction libraries containing both WORM and erasable optical platters, a numerical volume group can contain WORM or it can contain erasable media, but it cannot contain both.

Uniform, drive-specific attributes must be in the cleaning group.

Disparate Media in the Space Pool

If a numeric volume group enabled for space pool runs out of space, AMASS automatically reassigns a formatted volume with specific attributes from the space pool to the out-of-space volume group. Thus, AMASS can continue to write data to the numeric volume group.

Volumes in the space pool can contain a mixture of tape, optical, WORM, and erasable media.

Design Maintains Data Integrity

The AMASS file system is designed to conform to the standard UNIX data integrity functions and conventions. Data integrity elements are described on Page 1-14.

File Recovery	Because write operations go to the cache first (including <code>sync</code> , <code>fsync</code> , and synchronous IO), in the event of a system crash, AMASS recovers all write operations that were in the cache and processes the writes to media after the system is rebooted. This paradigm provides a level of data integrity consistent with standard UNIX file systems.
Database Recovery	Most UNIX file systems require <code>fsck</code> , a file system integrity check, of all file systems mounted at the time of a system crash. This checking can be very time-consuming. However, the online File System Database, eliminates the need for this checking. After you reboot the system, AMASS corrects its Database based upon the <code>/filesysdb/journal</code> file (a transaction log) and starts AMASS.
Library Recovery	<p>Media can be left in a drive if a system crash occurs. AMASS uses either external bar codes (network-attached libraries) or internal headers (SCSI-attached libraries) to identify a volume and automatically returns the “stranded” volume to its home position.</p> <p>Because these recovery functions are automated and can be run from the startup script after a system reboot, the AMASS recovery, startup, and file system mount can all be performed as part of other UNIX file system operations.</p>
Volume Verification	Volume verification is extremely important. Storage devices are subject to operator error and automated systems can suffer from hardware malfunctions leading to incorrect volumes being loaded into the drives.

As an aid in volume verification, the system administrator enters either a bar code or a user-defined label when introducing a volume to the File System Database. At the same time, AMASS assigns the volume a unique numerical ID. From then on, AMASS tracks the volume by this unique identifier and verifies the volume by using either bar codes or headers.

Increased Throughput

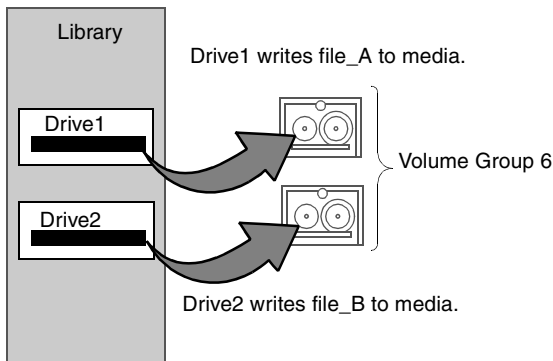
The way AMASS handles the operations listed below has increased throughput thereby improving performance:

- Tape rewind and eject operations run asynchronously. Tapes are returned to their home storage slots depending on which drive first becomes available.
- **Operating systems that support asynchronous operations only:** IO requests are asynchronously queued when you enable this parameter during AMASS installation.

Scattered Writes Improves Performance

When AMASS receives more than one request to write to the same volume group, AMASS uses a single drive, by default, to write to one volume at a time. However, you can improve performance by enabling scattered writes.

Scattered writes allows AMASS to use more than one drive to write to volumes in a volume group. For configuration parameters, refer to *Installing AMASS*.



Enabling scattered writes allows AMASS to use more than one drive to write data to the same volume group. Consequently, performance is improved.

Compression and Block Size Improves Throughput

Configuring compression and block size *typically* improves throughput for tape drives. Both features are configured with the AMASS `volformat` command. For more information on this command, refer to *Managing the AMASS File System*.

Refer to the AMASS Release Notes for a list of drives that support compression and configurable block size.

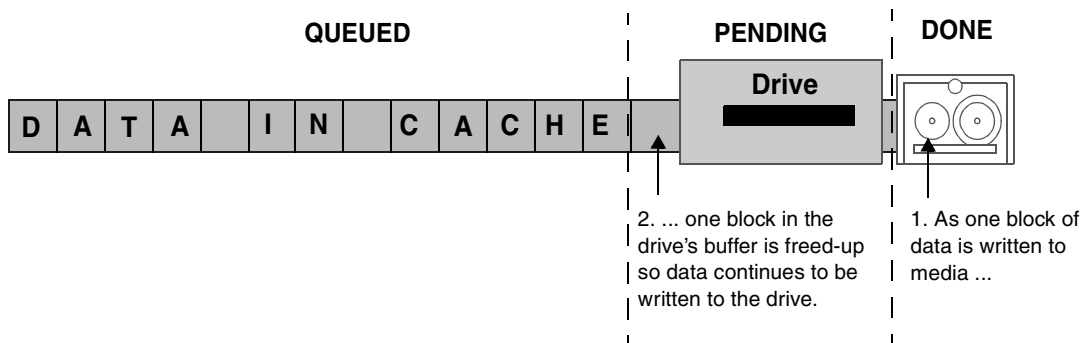
Tape Streaming Improves Write Performance

Streaming tape IO provides a constant flow of data output to a drive, which lessens start and stop operations. This feature *typically* improves write performance but depends on file size, number of files, and drive type.

During processing, a cache block has the following three states described:

- Queued = Cache block of data waiting for IO to start
- Pending = Cache block of data in the drives's buffer
- Done = Cache blocks that have been verified as written to media

The following figure illustrates these three states:



Tape streaming is configured globally with the `config_prod -o` script after you install AMASS. For more information about this script, refer to the Optional Parameters appendix in *Installing AMASS*.

Refer to the AMASS Release Notes for a list of valid drives for I/O tape streaming.

Tools

The following tools assist with file system tasks and troubleshooting:

Commands

The AMASS commands are a set of UNIX-style, command-line interfaces. These commands, as well as standard UNIX commands, help you manage archiving a file system onto media in storage devices. For a description of the AMASS commands and how to use them, refer to *Managing the AMASS File System*.

Scripts and Utilities

The AMASS scripts and utilities assist you in identifying and resolving problems among the File System Database, the files archived on media, and your hardware. For a description of the scripts and utilities and how to use them, refer to *Managing the AMASS File System*.

Automatic Drive Cleaning

AMASS supports automatic drive cleaning.

Refer to the AMASS Release Notes for a list of drives that support automatic drive cleaning.

For more information on drive cleaning, refer to *Managing the AMASS File System*.

Exceptions





Drive cleaning exceptions are noted below:

ADIC AML with DAS

Before using the AMASS `driveclean` command, comment out all cleaning-related configuration data in the `\das\etc\config` file on the OS/2 server.

ADIC Scalar 1000

AMASS does not support automatic drive cleaning on the ADIC Scalar 1000 with firmware earlier than level 2.10. Consequently, the Cleaning Mode must be disabled as follows:

- Step 1.** Enter the Main menu by pressing the Escape  button on the operator panel.
- Step 2.** Scroll the Main menu using the navigation buttons  or . Select the Setup menu by pressing Enter .
- Step 3.** Scroll the Setup menu using the navigation buttons, and select the Cleaning menu by pressing Enter.
- Step 4.** Scroll the Cleaning menu using the navigation buttons, and select the Drives dialog box by pressing Enter.
- Step 5.** See if the first line in the box shows that automatic drive cleaning is disabled, “Auto Clean: N”, if so then no further action is required. Press the Escape button until you reach the Status Display menu (the initial screen).

However, if the first line shows that automatic drive cleaning is enabled, “Auto Clean: Y”, change the Y to an N with the navigation buttons.

- Step 6.** Move to the “ACCEPT:N” part of the screen by pressing Enter, and change the N to a Y with the navigation buttons.
- Step 7.** Save the changed cleaning state by pressing Enter.

Step 8. Press Escape until you reach the Status Display menu (the initial screen).

Flexible

AMASS is both drive and library independent thus allowing you to choose the hardware that meets the specific needs of your company. For detailed information, refer to *Accessing Storage Devices*.

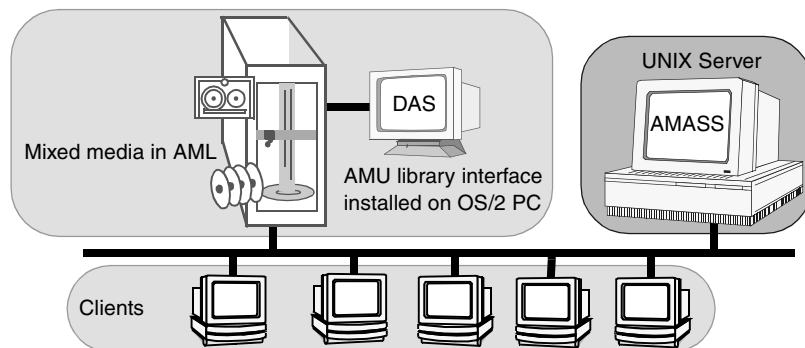
Third-party Backup Applications

AMASS supports third-party backup and restore applications that access files using standard file system semantics. Consequently, applications that currently run on standard UNIX file systems can use AMASS without modification.

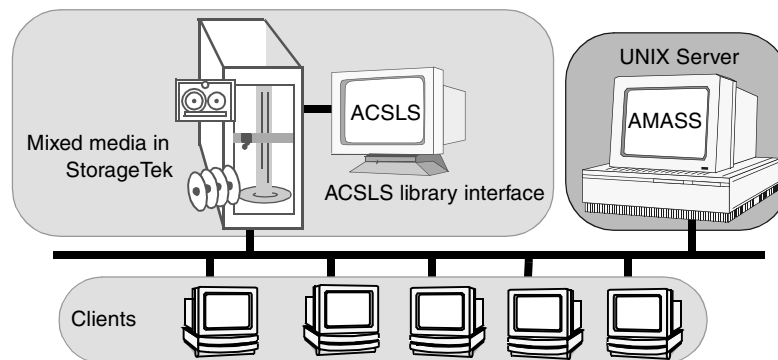
Mixed Media

AMASS supports mixed media in the following libraries:

- A network-attached AML using Distributed AML Server (DAS) as the library management software on the AMU. DAS is an ADIC-GRAU software product with both client and server components. The server component is installed on the AMU OS/2 server and the client component is embedded in AMASS.



- A network-attached Storage Technology storage device using Automatic Cartridge System Library Software (ACSLS).



During the AMASS installation, configure the unique media types with separate authorization strings. For example, if the AML contains both DLT and 3590 media, define AMASS with an authorization string for DLT JUKEBOX 1 and an authorization string for 3590 JUKEBOX 2.

For configuration instructions, refer to *Installing AMASS* and *Accessing Storage Devices*. For DAS installation and operation on the AMU, refer to the *DAS Installation and System Administration Guide*.

Optional Features

To enable the following optional features, obtain a unique authorization string from your AMASS sales representative. Enter this alphanumeric string during the installation process.

Optional Feature	Page
Offline Media Manager	1-22
Text Import and Export	1-22
Volume Copy	1-25
CD Import	1-26
DataMgr	1-26
Infinite File Life	1-27

Offline Media Manager

If media has been removed from a library, juke, or standalone drive, you must use the Offline Media Manger to access the offline media. When a file is accessed on offline media, a prompt asks the operator to load the correct volume into a drive so the request can be satisfied. For more information, refer to the "Operational Tasks" chapter in *Managing the AMASS File System*.

Text Import and Export

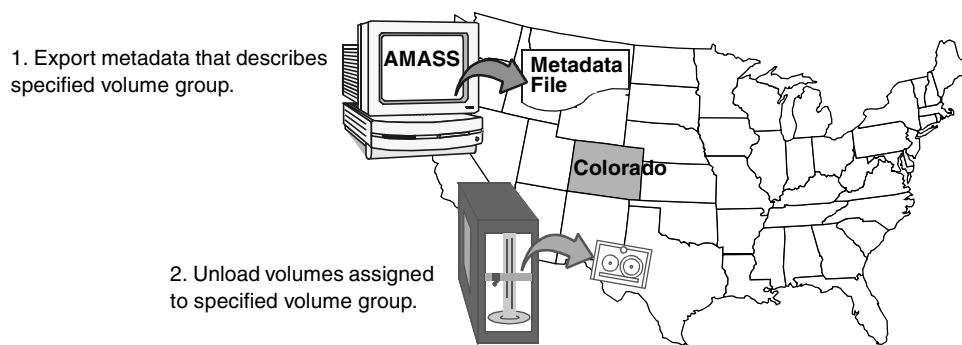
The `vgexport` and `vgimport` commands allow customers to move volume groups between two different AMASS systems.

From the Source AMASS System

The `vgexport` command exports the metadata (found on the source File System Database) for the specified volume group to standard out (`stdout`).

The metadata contains the directory structure and media attributes (such as media type, ownership, and timestamp) for a specified volume group. The metadata is located in `/usr/amass/filesysdb` and is exported as standard ASCII text. Send this file to the target AMASS site using FTP (File Transfer Protocol) or a similar tool.

The following figure illustrates these steps:



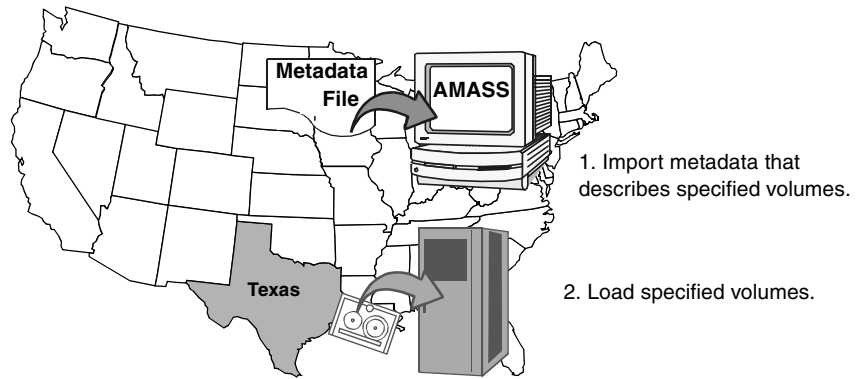
At the Target AMASS System

Introduce the media, where the specified volume group resides, to the target File System Database.

Use the `vgimport` command to import the metadata—that was sent by FTP—into the target File System Database.

AMASS compares the metadata with the volume number in the library and expects it to be the same. If there is a discrepancy, AMASS returns an error.

The following figure illustrates these steps:



For more information, refer to the Command Reference chapter in *Managing the AMASS File System*.

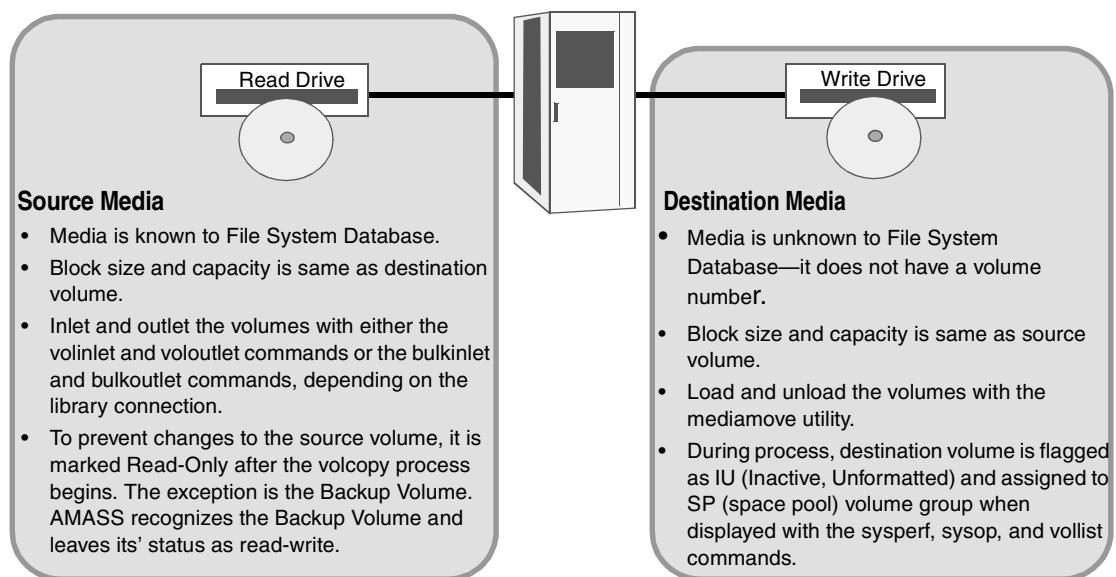
Volume Copy

The `volcopy` command copies data from a source volume to a destination volume. If the original volume is lost, destroyed, or damaged, you can use the duplicate volume exactly like you would the original. AMASS supports `volcopy` on the following media:

- WORM
- Rewritable optical
- Tape

This command copies the Backup Volume as well as all other volumes “known” to the File System Database. A volume is known to AMASS when an entry is created in the File System Database and AMASS assigns it a unique volume number.

Requirements are illustrated by the following figure:



For more information, refer to the Command Reference chapter in *Managing the AMASS File System*.

CD Import

Import data from CDs formatted by the standards prescribed by the following:

- High Sierra
- ISO 9660
- Rockridge (an ISO 9660 format with extensions)

Note
AMASS does not support writable CDs.

For more information, refer to the Command Reference chapter in *Managing the AMASS File System*.

DataMgr

DataMgr is an ADIC Hierarchical Storage Management (HSM) software package. DataMgr, in conjunction with AMASS, provides an automated method for moving client files—based on policies—from fast, expensive media to slower, more economical media. A file can be migrated by DataMgr either automatically or initiated manually by a client. For more information, refer to the *DataMgr Overview* book.

Infinite File Life

The Infinite File Life (IFL) optional feature automatically manages volatile media over an extended period. IFL performs the following functions:

- Tracks magnetic media, which degenerates over time
- Determines the amount of deterioration on each volume
- Replaces the media before it becomes unreadable

Refer to the AMASS Release Notes for a list of drives that support Infinite File Life (IFL.)

For more information about IFL, refer to the *Infinite File Life* document.

NOTES

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Accessing the Storage Network

NOTES

Local and Network Access

Because AMASS is implemented at the virtual file system (VFS) layer of the server's operating system, it is transparent to other software programs on the server. Consequently, AMASS as well as the file system mounted under AMASS can be accessed both locally and through a network. Both paths are discussed below.

Local Access

AMASS appears as a local, single, logical device with a single file system encompassing the entire capacity of the library or volume set. Because AMASS is totally transparent to local application level software, clients can access the file system using the same system calls that they use for standard UNIX file systems.

Network Access

The system call transparency provided by AMASS' VFS implementation allows the UNIX server running AMASS to be a server to an entire network of homogeneous or heterogeneous systems. The networking software runs without modification on top of AMASS so the server can run whatever networking communication protocols and their utilities are available, including TCP/IP-based protocols (FTP, RCP, and NFS), RFS, DECnet, or HYPERchannel.

Typical protocols are discussed below.

Network File System (NFS)

NFS is a facility for sharing files, resident on other machines, in a heterogeneous environment of machines, operating systems, and networks. NFS has become the de facto standard for distributed file systems and is available on a broad range of operating systems including UNIX, VMS, and MVS.

AMASS supports NFS by making its file system appear as a mounted local file system to the NFS server. This allows the AMASS file system to be exported in the same manner as the standard local file system is exported. Thus, the AMASS file system or its subdirectories can be mounted, across the network to the client file system, making the AMASS resident files, directories, and storage capacity available as though the AMASS software and its storage devices were running on the client.

The NFS interface to AMASS is both user- and application-transparent; and, under normal traffic patterns, the NFS and AMASS systems work well together. But, because of the inherent nature of a removable media device and the stateless design of the NFS facility, you must fine-tune the NFS configuration parameters to obtain the best possible performance for a given environment.

Delays, inherent in accessing files from a removable media library, can cause the NFS system to retry operations that are waiting for resources. While this will not cause the operations to fail, it may temporarily prevent other NFS operations from executing by using up the available NFS tasks or by causing excessive network traffic during the retry cycles.

For specific information on providing NFS clients access to the file system, refer to *Installing AMASS*.

File Transfer Protocol (FTP)

FTP allows users to transfer files easily from one machine to another over the network. To learn what functions can be invoked from your server processor FTP utility, refer to your server's reference manual.

Remote File Copy (RCP)

RCP allows the user to do file transfers to and from the AMASS without manually logging onto the remote system. The login function is performed automatically by the RCP utility. In addition, RCP can do recursive copies, which can copy an entire directory structure to or from the target. For the login function to work, the user's *user name* must exist on the target system; therefore, coordination of *user names* must be enforced across the network servers.

Telnet

Available Telnet functions depend on the processes started by a user's login name and password. Using Telnet in conjunction with a shell login process allows users to access utilities, such as `find` and `chmod`, which perform functions not available with FTP.

Security

Local: In local access mode, system security is primarily a function of setting the directory permissions in the AMASS file system. Because these permissions follow standard UNIX file system conventions, the specific settings are not documented here.

Network: For systems running in a network environment, AMASS security, as with other UNIX file systems, is primarily a function of the network systems or protocols used.

Use permissions appropriate for your users' environment.

Caution

With system administration tools, a user can bypass system security and modify AMASS configuration parameters that may deteriorate system performance. Therefore, ADIC suggests you restrict access to the scripts, utilities, and commands.

Supported Libraries and Drives

AMASS supports a maximum of:

- 8 libraries
- 256 drives per library
- 65,000 volumes

AMASS supports the following types of storage devices:

- Multiple libraries of the same model in a daisy-chained configuration
- Heterogeneous libraries, for example, optical and tape, in a daisy-chained configuration
- A library with different drive types so you can mix media; for example, 3590 and DTF media in the same library
- Standalone drives

For a list of supported libraries and drives as well as any other information unique to the support of storage hardware, refer to *Accessing Storage Devices*.

Connectivity

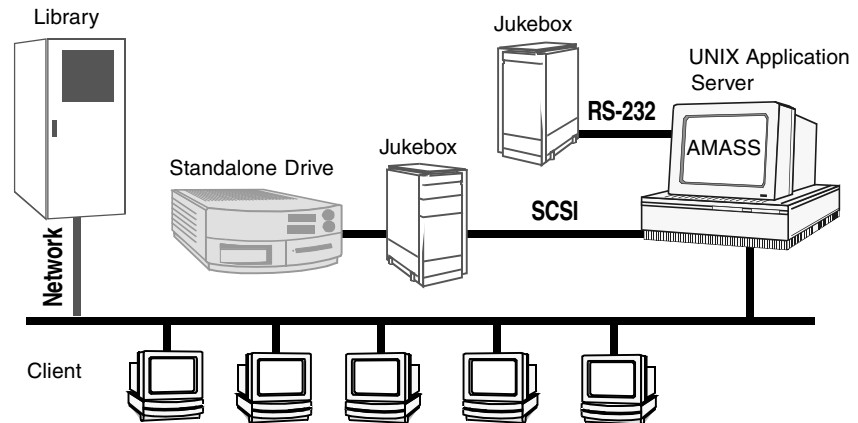
Libraries and standalone drives can be connected to the AMASS server in the following ways:

- SCSI-attached drives and libraries
- RS-232-attached libraries
- Network-attached libraries

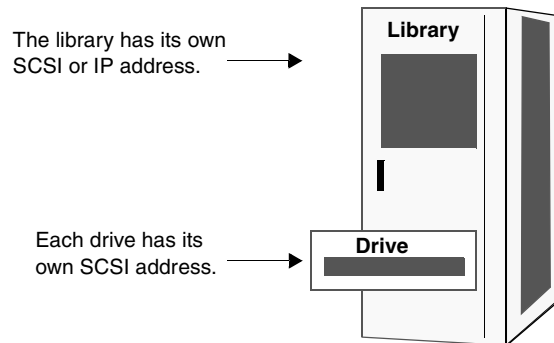
Tip

For best performance, ADIC recommends that each tape drive be on its own SCSI host adapter board.

The following figure illustrates these connections:

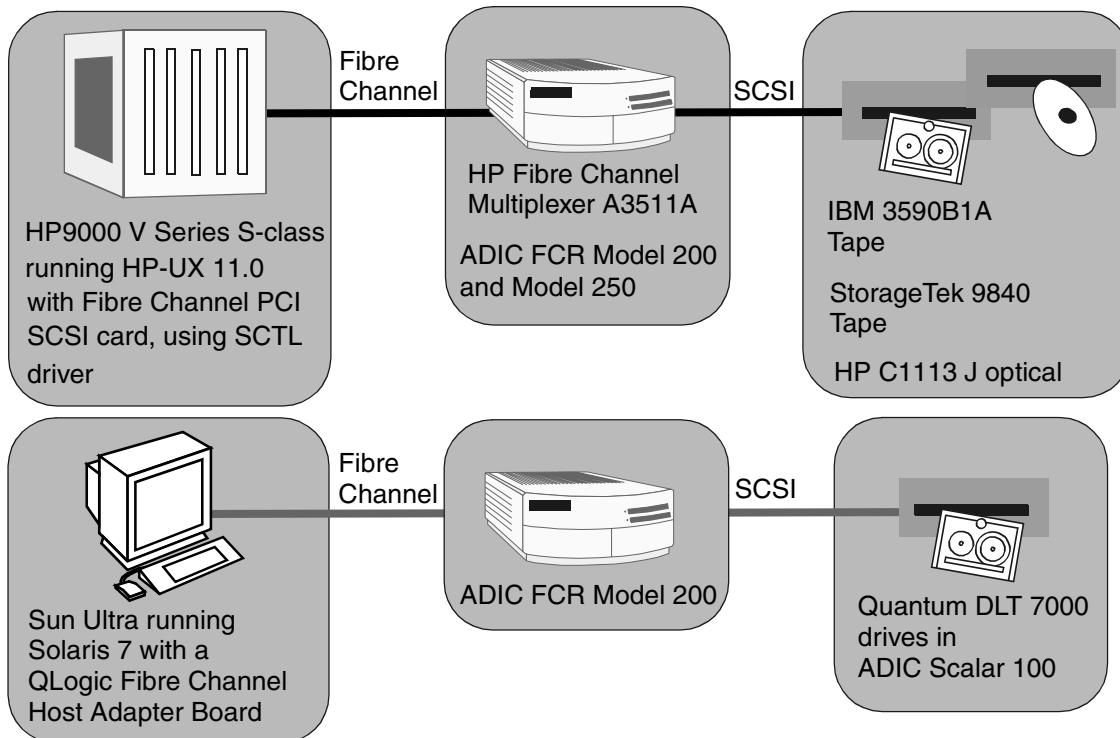


The following figure illustrates library and drive addresses:



Fibre Channel Support

This release of AMASS has been successfully tested on the following Fibre Channel configurations



The StorageTek 9840 is not supported as a network-attached device, only as a SCSI-attached device.

AMASS Installed on Platform	Multiplexer/Router	Drive
HP 9000 V series S-class running HP-UX 11.0 with a Fibre Channel PCI SCSI card using an SCTL driver	HP Fibre Channel Multiplexer A3511A (SCSI bridge)	IBM 3590B1A tape
	ADIC Fibre Channel Router (FCR) Model 200 and Model 250.	Storage Technology 9840 tape
		HP C1113 J optical
Sun Ultra running Solaris 7 with a QLogic Fibre Channel Host Adapter Board driver	ADIC Fibre Channel Router (FCR) Model 200	Quantum DLT 7000 in an ADIC Scalar 100

For more information about Fibre Channel support, refer to the appendix in *Installing AMASS*.

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Technical Support

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Phone Support

Depending on how you purchased technical support, telephone support is provided either through your reseller or directly through ADIC.

The ADIC Technical Assistance Center (ATAC) in Denver, Colorado provides world-wide service and support. Methods of contacting ATAC are listed below:

- In the USA and Canada, call 1-800-827-3822.
- Outside the USA and Canada, call toll-free 00800-9999-3822.
- Send e-mail to: support@adic.com

Training

The training organization in Denver provides hands-on instruction for ADIC products.

For a list of classes, call 720-249-5810 between 8 a.m. and 5 p.m. Mountain time.

Solutions Group

The ADIC Integrated Storage Solutions group can provide solutions and services customized for your site's requirements. These solution include:

- Analyzing requirements
- Designing, configuring, and tuning your system
- Customizing hardware and software solutions

For more information, call 303-792-9700 between 8 a.m. and 5 p.m. Mountain time.

Books

The CD contains the AMASS books as PDF files. The books described below are part of the technical documentation set:

AMASS Overview

An introduction to AMASS (Archival Management and Storage System). Contains a glossary.

Accessing Storage Devices

Alphabetically lists supported libraries and drives and provides AMASS-specific operating information. Describes how to use AMASS with standalone drives.

Installing AMASS

Describes: server requirements, installation and troubleshooting procedures, and configuration parameters.

Managing the AMASS File System

Perform system administrative tasks with AMASS commands and troubleshoot problems with AMASS utilities and scripts.

Errors and Corrective Action

Provides corrective action for system log errors.

Quick Reference Guide

Summarizes commands and utilities.

Contact Publications

To make corrections or to comment on AMASS publications, please contact Technical Publications at techdocs@adic.com.

Related Publications

The publications described in the following table are created and distributed on an as-needed basis:

Related Publications	Description
Release Notes	For each version of AMASS, the Release Notes contain: <ul style="list-style-type: none">• Summary of enhancements• Describes:<ul style="list-style-type: none">- Fixed problems- Known problems
Product Alerts	Informs customers of technical problems and solutions
Product Bulletins	Conveys technical information — not problems — to customers

Secured Web Site

To receive access to the secured site on ADIC's home page containing technical product information (Release Notes, Product Alerts, Product Bulletins, FAQs), visit <http://partners.adic.com/> and follow the password request procedure. In return, ADIC will send instructions and a password.

Year 2000 Compliant

When AMASS is running on Year 2000-compliant operating systems, including systems with Y2k-compliant patches, AMASS is Year 2000 Option 1-compliant. This means that a year is designated as a four-digit number, for example, 1999. AMASS has been year 2000 compliant since Version 4.9.1

Glossary

Note

The terms in this Glossary are used throughout the ADIC UNIX software documentation. Product-specific terms are noted.

A

AMASS[®]

The Archival Management and Storage System (AMASS) is storage management software. AMASS archives files onto media stored in robotic libraries, jukeboxes, and standalone drives. When applications need to read or write to archived files, the files appear as a single, mounted file system on the server. The file system under AMASS is supervised by a system administrator who manages the libraries, drives, and media on UNIX and Windows NT platforms.

API

Application Programming Interface. The API consists of functions, iterators, symbolic names, type definitions, and data structures. Using the API provides a programmer with the ability to directly

manipulate AMASS file system metadata (such as, namespace) and media. Using the API is a way for a program to ask AMASS to perform a service unique to your site.

appended files

Files that span media. The files are on more than one piece of media, possibly, on more than one library.

archive

Generally used to denote a file that is stored on lower cost media than a hard disk. The goal for implementing data archiving is to conserve online storage space. Contrast with backup.

B

backup

A file that has been backed up means that a copy of the file exists in another location. If the original file is lost, the backup file is used. Having a backup file protects you against loss or damage of the original data. Contrast with archive.

bar code

An array of spaces and vertical bars in varying widths in a machine-readable pattern. Media is identified by barcode rather than a physical home storage slot.

BFS

Bitfile Server component of DataMgr. The BFS maintains storage policies, assigns bitfile IDs, and manages the licensing of clients.

bitfile

Bitfile identifies the contents of a migrated file on DataMgr. Bitfiles are never modified. If the original file is subsequently modified, a new bitfile (as well as a new bitfile ID) is created when the file is remigrated.

bitfile ID

DataMgr assigns each migrated file a unique bitfile ID. The bitfile ID is never changed and is never reused.

C

cache

All data flows into a central cache located on the UNIX server before being read from or written to media. By using the cache, AMASS allows applications to read and write at hard disk speeds, and to access the library only when the requested data is not in the cache. See also striping.

cleaning group

A special volume group that contains drive cleaning cartridges. AMASS automatically uses a cleaning cartridge from this group when it receives the appropriate SCSI request sense data from specific drives.

client

Program running on a workstation requests the services provided by a network server. Part of a client/server architecture.

D

DAS[™]

Distributed AML Server. An ADIC software product with both client and server components. The server component is installed on an OS/2 PC and the client component is installed on the same UNIX workstation where AMASS is installed. With DAS, AMASS supports different media types in the same library.

DataClass group

Migration directories with the same associated data class parameters are in the same DataClass grouping. A FileServ-specific term.

DataMgr[™]

An optional ADIC HSM software product. DataMgr in conjunction with AMASS for UNIX provides a method for migrating client files — based on frequency of access — from fast, expensive media to slower, more economical media. DataMgr migrates (and reloads) files either manually or automatically. See also HSM.

dead space

Random space that remains on a volume after files have been deleted.

DLT[™]

Digital Linear Tape.

DMFS

DataMgr File System component of DataMgr. The DMFS provides file migration capability for each machine it is installed on. It is installed on all client machines that have a file system migrated by DataMgr.

drive pool

A logical grouping of drives that provide drive sharing capability between clients. A FileServ-specific term.

drives

A physical device used to read and write data on media. AMASS manages the drives to perform the following tasks:

- Service data movement requests
- Handle library services
- Schedule read and write requests

E

Ethernet

A networking system designed to connect computers that are relatively close together (physically in the same department). The specification has been defined by IEEE Standard 802.3. Other software, such as TCP/IP, runs on top of Ethernet to provide high-level networking services to applications.

F

FCB

File Control Block. A kernel file system memory resident data structure containing information about a file including metadata.

FDDI

Fiber Distributed Data Interface A high-speed fiber-optic local area network that is based on the token ring standard.

file

A collection of related data, such as:

- Text
- Tables
- Digitized audio and visual records

file import

A DataMgr feature that imports data from a “foreign” archival file system into DataMgr to be archived by AMASS.

file replication

A storage policy that migrates files from a client machine through DataMgr and AMASS to a primary storage library. The data is then replicated (copied) to a maximum of three other storage devices.

FileServ™

FileServ acts as an online storage node for specific libraries by managing online user data and providing quick response to client requests for data. When data is not required for active processing, FileServ migrates it to magnetic tape to maintain free disk space.

file system

An organized set of files that appear as a part of a directory structure, when used under UNIX. All files managed by AMASS are under a mount point whose default name is */archive*. The AMASS file system is accessed as if it were located on a local hard drive, instead of actually residing in media either in a storage device or even in offline storage.

File System Database

The File System Database contains tables of attributes—or metadata—representing the directory structure and media mounted under the AMASS file system. The metadata includes: media ID, media type, media location, ownership, and timestamp. The File System Database tells AMASS where data is located on the media archived in your library. The default location in UNIX is in `/usr/filesysdb`. See also `inode` and `metadata`.

G

GUI

Graphical User Interface. The human juncture between an end user and a software product. It contains a series of pictorial menus that lead a user in a task accomplished usually with a mouse, instead of a keyboard.

H

HSM

Hierarchical Storage Management. A data management strategy where data is migrated to storage in either a layered or serial method based on a set of policies. A paradigm that often controls this migration is frequency of access. For

example, the least frequently accessed files are first migrated onto fast magnetic tape which are later stored on slower optical platters. The goal for implementing an HSM strategy is to provide clients with increased space on existing disk drives. See also `DataMgr™` and `FileServ™`.

I

inode

A programming structure that maps metadata to the “real” data found on media. See also `DataMgr™` and `metadata`.

IP address

Central to TCP/IP communication is the IP address that allows devices to talk to each other. The IP address is a device’s logical network address consisting of a four-byte number separated by full stops, such as 128.8.14.92.

IPI

Intelligent Peripheral Interface. A high-performance, general-purpose parallel peripheral interface. The intent of the IPI is to isolate the host, both hardware and software, from changes in peripherals by providing a “function generic” command set to allow the connection of multiple types of peripherals (disks, printers, and tapes.)

J

Journal

The Journal tells AMASS what transactions—what entries—have acted upon a file stored on a volume in a library. It is a daily diary of logged events. The Journal’s default location in UNIX is `/usr/filesysdb/journal`. Typically, this is a symbolic link pointing to a separate physical disk to keep the Journal on a different disk from the File System Database.

jukebox

A storage device for data containing one or more drives. Usually, media is loaded manually. In the AMASS books, the word library is a generic word that denotes a jukebox or standalone drive. See also library and standalone drives.

L

label

A tag affixed to media used for identification. For example, a bar code label is used by a robotic device to insure the robot is moving the proper media. A shelf label with human-readable information has the same purpose.

library

A storage device for data containing one or more drives. Usually, media is loaded by a robotic (automated) picker. See also jukebox and standalone drives.

M

mailbox

An opening on the front of a library where media is loaded into the library and unloaded to the outside world, without opening the actual library. This protects the inside of the library from dust and dirt. Also known as a mailslot.

media

A storage object that, when mounted in a drive, is used for read and write operations. See also volume. Media types include:

- Tape

- Optical
- CD

metadata

Represents the directory structure and attributes about media. Attributes include:

- Media ID
- Media type
- Media location
- Ownership
- Timestamp

The metadata for the AMASS file system resides in the AMASS database. See also File System Database and inode.

migration

The planned movement of data from one library — and possibly from one type of media — to another.

multi-tier migration

A storage policy that migrates files from a client machine through DataMgr and AMASS to a primary storage library. The file is then migrated to a second and third storage device after a specific time limit.

N**NFS**

Network File System. Originally developed by Sun Microsystems, it has become the de facto standard for file sharing between UNIX systems. NFS was designed to be a distributed file service that is operating system-independent and machine-type-independent. Consequently, any computer system can supply files to many different computer types. NFS uses the Remote Procedure Call (RPC) mechanism to perform tasks, read results, and access remote files.

NIS

Network Information Service. Created by Sun to make NFS easier to use. NIS centralizes user and group name databases for an entire domain. (A domain consists of a master server, slave servers, and clients.) NIS allows the domain to be administered as if it were a single system. NIS centralizes many of the local network configuration functions. NIS used to be called Yellow Pages (YP).

nonresident file

A nonresident file is a file whose contents have been migrated to a storage device. The file is nonresident on the client's machine but DataMgr leaves behind a stub file.

O

optical

Types of optical platters are described below:

- **MO (Magneto Optical)** is rewritable optical. It uses both magnets and lasers to write and read data on a plastic disc having a magnetic layer. Data is written when the laser beam heats bits on the disc's magnetic layer that are then magnetically polarized by the drive's magnet.
- **Ablative™** is an IBM term for the technology used to make **WORM** media. Lasers burn the write into the media thus ensuring that the media is **Write-Once Ready-Many (WORM)**.
- **CCW (Continuous Composite Writes)** use the erasable (MO) method to write files onto a disc but then locks the files to the media with software.

- **LIMDOW (Light Intensity Modulation Direct OverWrite)** speeds up the process of writing to **MO** discs. **LIMDOW** discs have one memory layer instead of two and consequently require only one pass to write instead of two.

Offline Media Manager

If media has been removed from a library, **Offline Media Manager**, an optional feature on **AMASS** that allows you to access the offline media. When a file is accessed on offline media, a prompt asks the operator to load the correct volume into a drive so the request can be satisfied.

R

RAID

Redundant Array of Independent Disks. Technique for using a group of disk drives to improve performance, data availability, or both.

resident file

All files before they are migrated by **DataMgr** are resident files.

RPC

Remote Procedure Call. Process that supplies a program a set of procedures that can be called remotely.

S

scattered writes

If multiple writes occur to a single volume group, AMASS uses more than one drive to simultaneously write to the volume group. This increases throughput.

SCSI Fast/Wide

Small Computer System Interface. An intelligent bus-level device interface. Refers to a combination of Fast transfer rate (10 MB per second) with a two-byte wide (68 pins) connector, which results in 20 MB/sec data transfer rate.

server

Programs running on a network server provide computing or data services to a client. Part of a client/server architecture.

SLD

Service Locator Daemon component of DataMgr. The SLD maps the name of a DataMgr service (BFS, SSD) to the archiving service (AMASS).

slot

Referred to as a bin in some libraries. The physical home storage slot where a single piece of media resides. In standalone drives, the slot is the same as the drive, but in all other libraries that is not true.

SMP

Symmetric Multiprocessing. Making efficient use of multiple processors within a computer.

space pool

A special volume group that contains formatted volumes. The volumes in the space pool are used by numeric volume groups that have run out of space. When a volume group runs out of space, AMASS automatically takes a volume from the space pool and reassigns it to the out-of-space volume group.

SSD

Storage Server Daemon component of DataMgr. The SSD provides an RPC interface from DataMgr clients to AMASS.

standalone drives

A storage device for data containing a single drive. Usually, media is loaded manually in a standalone drive. See also jukebox and library.

Storage Area Network

A storage area network (SAN) is a dedicated high-speed Fibre channel topology. The application servers are attached to the storage devices for specific tasks.

storage policy

DataMgr migrates files using storage policies, including Single Copy, Multi-tier Migration, and File Replication.

striping

The UNIX operating system allows AMASS to cache data across multiple magnetic disks on the server or across partitions on a single magnetic disk on the server. This feature improves AMASS throughput. AMASS divides the data into segments (stripes) and writes each segment either to multiple disks or to partitions on a disk. These raw disks or raw partitions are defined as cache space names with the AMASS installation script. See also cache.

stub file

DataMgr leaves a stub file on a file system after the original file has been migrated to AMASS. The original file is truncated (stubbed) to the smallest allocatable disk block on the file system and its contents is replaced with all the information necessary to access the migrated file.

T

TCP/IP

Transmission Control Protocol/Internet Protocol. Runs on top of Ethernet to provide high-level networking services to applications. See also IP address.

thrashing

Unnecessary movement of the library's robotics. For example, retrieving disc 1, then disc 6, then 1, then 6. Thrashing causes access delays and premature hardware failure.

truncate

Remove the file data blocks from disk, leaving the inodes on disk. Only files that remain unchanged since the last storage to media can have their data blocks truncated from disk. A FileServ-specific term.

U

UNIX™

A computer operating system that runs on workstations, servers, mainframes, and supercomputers.

V

VBS

The Virtual Block Server is an AMASS component that emulates a hard disk drive that maps an infinitely large block of space on to physical libraries, drives, and media. Use the GUI to monitor the Virtual Block Server.

volume

Equivalent to media. See also media.

- offline = Media that does not reside in a library. Although AMASS assigned this media a unique volume number and there is an entry for it in the AMASS database, the media may be stored in a vault or on a shelf.
- online = Media residing in a library. AMASS assigned this media a unique volume number and there is an entry for it in the AMASS database.
- inactive = AMASS cannot read or write to this volume.

volume group

Media assigned to a group with AMASS for a specific purpose, such as projects or departments. Volume groups include:

- Numerical group
- Space pool

- Cleaning group

volume number

A unique number assigned by AMASS (UNIX) to each piece of media when an entry is created in the File System Database for the media.

VolServ™

Manages media and volumes contained within both automated and manual libraries.

W

Windows NT™

An operating system with two versions—one for workstations and one for servers. Windows NT is designed to run on a network. Each application runs in its own on-screen window. Windows NT replaces the command line interface with pictures.

X

XDI

eXtensible Device Interface. An AMASS software module that provides a communication interface between AMASS and network-attached storage devices. Communication includes:

- Operations (mount and dismount, import and export, query volume and query drives)
- Audits
- Hardware information
- Errors

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